



## EPA Region 7 TMDL Review

**TMDL ID:** KS-MO-07-601\_4  
**Document Name:** TURKEY CREEK

**State:** KS

**Basin(s):** MISSOURI, MISSOURI RIVER BASIN

**HUC(s):** 10240007

**Water body(ies):** BURGER CREEK, MANLEY CREEK, TURKEY CREEK, WILDCAT CREEK, WOLF CREEK

**Tributary(ies):** BURGER CREEK, CLEAR CREEK, MANLEY CREEK, TURKEY CREEK (5), WILDCAT CREEK, WOLF CREEK (12), WOLF CREEK (13)

**Pollutant(s):** ATRAZINE

**Submittal Date:** 9/5/2007

**Approved:** Yes

### Submittal Letter

*State submittal letter indicates final Total Maximum Daily Load(s) (TMDL) for specific pollutant(s)/water(s) were adopted by the state, and submitted to EPA for approval under section 303(d) of the Clean Water Act [40 CFR § 130.7(c)(1)]. Include date submitted letter was received by EPA, date of receipt of any revisions, and the date of original approval if submittal is a phase II TMDL.*

The TMDL for Turkey Creek with an impairment of atrazine was formally submitted from Kansas Department of Health and Environment (KDHE) and received by United States Environmental Protection Agency (EPA) in a letter on September 5, 2007. A revision version addressing EPA comments was received by email attachment on October 26, 2007.

### Water Quality Standards Attainment

*The water body's loading capacity (LC) for the applicable pollutant is identified and the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources is described. TMDL and associated allocations are set at levels adequate to result in attainment of applicable water quality standards (WQS) [40 CFR § 130.7(c)(1)]. A statement that WQS will be attained is made.*

The TMDL target is based on the numeric water quality criteria for atrazine of 3 ug/L. The LC assigned will be based on the stream flow volume and is defined by:

$$LC = \text{Flow} \times 3 \text{ ug/L} \times C$$

LC is expressed as a load duration curve with LC calculated as:  $WQS \times \text{Flow} \times \text{Conversion Factor}$  plotted against percentile of flow exceedance.

The ultimate endpoint for this TMDL will be to achieve the Kansas WQS fully supporting Chronic Aquatic Life Use. Successful accomplishment of this goal indicates loads are within the LC of the stream, the WQS are attained and full support of the designated uses of the stream has been achieved.

EPA agrees that attainment of the LC should result in the attainment of WQS.

### Numeric Target(s)

*Submittal describes applicable WQS, including beneficial uses, applicable numeric and/or narrative criteria. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, site specific if possible, was developed from a narrative criterion and a description of the process used to derive the*

target is included in the submittal.

The applicable WQS for Aquatic Life Support are 3 ug/l for atrazine (KAR 28-16-28e(c)(2)(D)(ii)).

The designated uses for all streams are Aquatic Life Use and Secondary Contact Recreation Use (b). For Turkey Creek it's only designated use is Food Procurement. Manley and Wolf Creek share designated uses of Domestic Water Supply Use, Food Procurement, Industrial Water Supply, Irrigation, and Livestock Watering Use.

This TMDL addresses the impairments to chronic aquatic life support and will be protective of the aquatic life criteria.

### **Pollutant(s) of concern**

*An explanation and analytical basis for expressing the TMDL through surrogate measures (e.g., parameters such as percent fines and turbidity for sediment impairments, or chlorophyll-a and phosphorus loadings for excess algae) is provided, if applicable. For each identified pollutant, the submittal describes analytical basis for conclusions, allocations and margin of safety (MOS) that do not exceed the LC. If submittal is a phase II TMDL there are refined relationships linking the load to WQS attainment. If there is an increase in the TMDL there is a refined relationship specified to validate the increase in TMDL (either load allocation (LA) or waste load allocation (WLA)). This section will compare and validate the change in targeted load between the versions.*

The link between the numeric targets and pollutant of concern is direct. LC is expressed through the use of load duration curves at two points in the affected drainage area.

### **Source Analysis**

*Important assumptions made in developing the TMDL, such as assumed distribution of land use in the watershed, population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources, are described. Point, nonpoint and background sources of pollutants of concern are described, including magnitude and location of the sources. Submittal demonstrates all significant sources have been considered. If this is a phase II TMDL any new sources or removed sources will be specified and explained.*

Atrazine herbicide has been widely used in Kansas since the 1960's for selective control of broadleaf and grass weeds in corn and grain sorghum. With a relatively long-half life of 60 days, this herbicide is weakly absorbed by soil particles. Approximately 90% of atrazine loss occurs in the water portion of runoff with only 10% within the eroding soil particles. As a result, the main source of atrazine in surface water is runoff from agricultural fields. The contribution of atrazine to the surface water from point sources or irrigation is very minimal.

The suggested planting dates in this region of Kansas are April 15-May 20 for corn and May 15-June 20 for sorghum. According to the 2001 National Land Cover database, 26.9% of the Turkey Creek watershed is cultivated cropland. The Kansas portion of the watershed has a higher percentage of cropland (36.8%) and a lower percentage of grassland compared to the whole watershed. About two thirds of the cropland (68%) in the watershed or more than half (57%) in the Kansas portion is located within a half mile of the streams. The runoff from these fields can easily enter the streams following a precipitation event. The months of May through July (Spring season) exhibit potential for the highest runoff due to increased precipitation, as well as the planting seasons for corn and sorghum. The periods of violations of WQS coincide with the planting seasons for corn and sorghum.

The exceedances of WQS occurring in April are likely caused by atrazine applications during the corn planting season with exceedances occurring in late May and July likely caused by atrazine applications during the sorghum planting season. The higher magnitude of exceedances in April probably reflects acres of corn and "first-flush" of early spring runoff in the streams.

All known significant sources have been considered at this time.

### **Allocation - Loading Capacity**

*Submittal identifies appropriate WLA for point, and load allocations for nonpoint sources. If no point sources are present the WLA is stated as zero. If no nonpoint sources are present, the LA is stated as zero [40 CFR § 130.2]*

(i)]. If this is a phase II TMDL the change in LC will be documented in this section.

A TMDL is defined as:

$$\text{TMDL} = \text{LC} = \text{WLA} + \text{Background} + \text{MOS} + \text{LA}$$

The TMDL target is based on the numeric WQS for atrazine of 3 ug/L. The assigned LA will be based on the stream flow volume which is defined by:

$$\text{LA} = \text{Flow} \times 3 \text{ ug/L} \times \text{C}$$

The entirety of the LC is based upon the LA, example at the 50% flow, and the LA would be 0.4 lbs/day atrazine, as shown in Table 9 of the TMDL.

### **WLA Comment**

*Submittal lists individual WLAs for each identified point source [40 CFR § 130.2(h)]. If a WLA is not assigned it must be shown that the discharge does not cause or contribute to WQS excursions, the source is contained in a general permit addressed by the TMDL, or extenuating circumstances exist which prevent assignment of individual WLAs. Any such exceptions must be explained to a satisfactory degree. If a WLA of zero is assigned to any facility it must be stated as such [40 CFR § 130.2(i)]. If this is a phase II TMDL any differences in phase I and phase II WLAs will be documented in this section.*

Due to the nature of the atrazine impairment a WLA of zero will be assigned to any point sources for atrazine under this TMDL.

EPA agrees this is an appropriate WLA.

### **LA Comment**

*Includes all nonpoint sources loads, natural background, and potential for future growth. If no nonpoint sources are identified the LA must be given as zero [40 CFR § 130.2(g)]. If this is a phase II TMDL any differences in phase I and phase II LAs will be documented in this section.*

At medium flow (50% flow exceedance) the LA= 0.4 lbs/day. The LA is expressed as load duration curves which account for seasonal variation in flow for each impaired segment.

EPA agrees this is an appropriate LA.

### **Margin of Safety**

*Submittal describes explicit and/or implicit MOS for each pollutant [40 CFR § 130.7(c)(1)]. If the MOS is implicit, the conservative assumptions in the analysis for the MOS are described. If the MOS is explicit, the loadings set aside for the MOS are identified and a rationale for selecting the value for the MOS is provided. If this is a phase II TMDL any differences in MOS will be documented in this section.*

The MOS is implicitly set because the average reduction is based on the events where runoff and exceedances occur, and does not consider the conditions before April and after July.

Due to the establishment of an implicit MOS, EPA understands that a numeric load does not correlate with this MOS.

### **Seasonal Variation and Critical Conditions**

*Submittal describes the method for accounting for seasonal variation and critical conditions in the TMDL(s) [40 CFR § 130.7(c)(1)]. Critical conditions are factors such as flow or temperature which may lead to the excursion of WQS. If this is a phase II TMDL any differences in conditions will be documented in this section.*

Seasonal variation has been incorporated in this TMDL through the documentation of seasonal patterns of elevated atrazine levels.

The months of May to July have the highest runoff potentials for atrazine due to the increased precipitation as well as the planting seasons for corn and sorghum. All exceedances that took place during the Spring season were either at high or medium flow. The periods of violations coincide with the planting seasons of corn and

sorghum.

Seasonality and any critical conditions have been addressed in the submittal.

### **Public Participation**

*Submittal describes required public notice and public comment opportunity, and explains how the public comments were considered in the final TMDL(s) [40 CFR § 130.7(c)(1)(ii)].*

**Public meetings:** Public meetings to discuss TMDLs in the Missouri Basin have been held since 2001. An active internet website was also established at [www.kdheks.gov/tmdl/](http://www.kdheks.gov/tmdl/) to convey information to the public on the general establishment of TMDLs in the Missouri Basin and these specific TMDLs. The TMDL was available from June to August 2007.

**Public Hearings:** On May 30, 2007 in Hiawatha, a public meeting was held in regards to the Missouri Basin TMDLs.

Comments on this TMDL were received from EPA. These comments were addressed in the revised submittal of October 26, 2007.

EPA agrees the TMDL received the opportunity for meaningful public input.

### **Monitoring Plan for TMDL(s) Under Phased Approach**

*The TMDL identifies a monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of WQS, and a schedule for considering revisions to the TMDL(s) (where phased approach is used) [40 CFR § 130.7].*

KDHE will continue to collect samples at stations 601 and 234 in each of the three defined seasons during the years of 2007-2011. Based on that sampling, evaluation will be performed in 2012 to determine priority status for implementation. Should impaired status remain, the desired endpoints under this TMDL will be refined and additional intensive sampling may need to be conducted over the period of 2012-2015 to assess the progress in this TMDL's monitoring tactics.

### **Reasonable Assurance**

*Reasonable assurance only applies when less stringent WLAs are assigned based on the assumption of nonpoint source reductions in the LA will be met [40 CFR § 130.2(i)]. This section can also contain statements made by the state concerning the state's authority to control pollutant loads.*

Reasonable assurances are not required for this TMDL because facilities' WLA are set to zero. Kansas has identified several Federal, State, local and non-government organizations that may be included in the implementation process, including enforced compliance measures as needed for NPDES permits.